

WHAT IS CLAIMED IS:

1. A digital image encoding device comprising:

conversion means for converting digital image data into a coefficient based on a spatial frequency;

5 quantization means for quantizing the coefficient obtained by said conversion means; and

coefficient bit modeling means for carrying out coefficient bit modeling by using said coefficient quantized by said quantization means,

10 wherein said digital image data is divided into a plurality of subbands in said conversion means,

said coefficient bit modeling means comprises;

code block division means for dividing each of said subbands into a plurality of code blocks;

15 bit plane decomposition means for decomposing each of coefficients of said code blocks obtained by said code block division means into a plurality of bit planes for each bit weight;

subbit plane decomposition means for decomposing each of said bit planes obtained by said bit plane decomposition means into  
20 a plurality of subbit planes based on usefulness; and

predetermined data generation means for generating predetermined data in accordance with said subbit planes obtained by said subbit plane decomposition means,

and said coefficient bit modeling means comprises

25 requantization means for requantizing a predetermined subbit plane among said subbit planes obtained by said subbit plane decomposition means and passing data after said

requantization to said predetermined data generation means.

2. The digital image encoding device according to claim 1,  
wherein said requantization means carries out said requantization,  
5 provided that the following three conditions are satisfied;

a first condition where a currently processed subband is  
not a band of a lowest frequency compared with said subbands,

a second condition where a currently processed bit plane  
has weight lighter than predetermined weight, and

10 a third condition where said number of "1" in a currently  
processed subbit plane is equal to or lower than a predetermined  
value.

3. The digital image encoding device according to claim 2,  
15 wherein said requantization means resets all currently processed  
subbit planes to "0", when said three conditions are satisfied.

4. The digital image encoding device according to claim 2,  
wherein said requantization means resets all currently processed  
20 subbit planes and subbit planes lower in order than said subbit  
planes to "0", when said three conditions are satisfied.

5. The digital image encoding device according to claim 2,  
wherein said requantization means cancels processing of a  
25 currently processed code block and carries out processing of a next  
code block, when said three conditions are satisfied.

6. The digital image encoding device according to claim 2,  
wherein said predetermined weight of said second condition and  
said predetermined value of said number of "1" of said third  
condition can be selected for every subbands and in accordance  
5 with a decomposition level of said conversion means.

7. A digital image encoding method comprises:  
conversion step of converting digital image data into a  
coefficient based on a spatial frequency;  
10 quantization step of quantizing said coefficient obtained  
by said conversion step; and  
coefficient bit modeling step of carrying out coefficient bit  
modeling by using said coefficient quantized by said quantization  
step,

15 wherein said digital image data is divided into a plurality  
of subbands in said conversion step,

said coefficient bit modeling step comprises;  
code block division step of dividing each of said subbands  
into a plurality of code blocks;

20 bit plane decomposition step of decomposing each of  
coefficients of said code blocks obtained by said code block division  
means into a plurality of bit planes for each bit weight;

subbit plane decomposition step of decomposing each of  
said bit planes obtained by said bit plane decomposition step into a  
25 plurality of subbit planes based on usefulness; and

predetermined data generation step of generating  
predetermined data in accordance with said subbit planes obtained

by said subbit plane decomposition step,

and said coefficient bit modeling step comprises

requantization step of requantizing a predetermined  
subbit plane among said subbit planes obtained by said subbit  
plane decomposition step and passing data after said  
requantization to said predetermined data generation step.

8. The digital image encoding method according to claim 7,  
wherein said requantization step carries out said requantization,  
provided that the following three conditions are satisfied;

a first condition where a currently processed subband is  
not a band of a lowest frequency compared with said subbands,

a second condition where a currently processed bit plane  
has weight lighter than predetermined weight, and

a third condition where said number of "1" in a currently  
processed subbit plane is equal to or lower than a predetermined  
value.

9. The digital image encoding method according to claim 8,  
wherein said requantization step resets all currently processed  
subbit planes to "0", when said three conditions are satisfied.

10. The digital image encoding method according to claim  
8, wherein said requantization step resets all currently processed  
subbit planes and subbit planes lower in order than said subbit  
planes to "0", when said three conditions are satisfied.

11. The digital image encoding method according to claim 8, wherein said requantization step cancels processing of a currently processed code block and carries out processing of a next code block, when said three conditions are satisfied.

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12. The digital image encoding method according to claim 8, wherein said predetermined weight of said second condition and said predetermined value of said number of "1" of said third condition can be selected for every subbands and in accordance with a decomposition level of said conversion step.

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13. A program for causing a computer to perform a digital image encoding method, said method comprising:

conversion step of converting digital image data into a coefficient based on a spatial frequency;

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quantization step of quantizing said coefficient obtained by said conversion step; and

coefficient bit modeling step of carrying out coefficient bit modeling by using said coefficient quantized by said quantization

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step,

wherein said digital image data is divided into a plurality of subbands in said conversion step,

said coefficient bit modeling step comprises;

code block division step of dividing each of said subbands into a plurality of code blocks;

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bit plane decomposition step of decomposing each of coefficients of said code blocks obtained by said code block division

means into a plurality of bit planes for each bit weight;

subbit plane decomposition step of decomposing each of said bit planes obtained by said bit plane decomposition step into a plurality of subbit planes based on usefulness; and

5 predetermined data generation step of generating predetermined data in accordance with said subbit planes obtained by said subbit plane decomposition step,

and said coefficient bit modeling step includes

10 requantization step of requantizing a predetermined subbit plane among said subbit planes obtained by said subbit plane decomposition step and passing data after said requantization to said predetermined data generation step.

14. The program according to claim 13, wherein said  
15 requantization step carries out said requantization, provided that the following three conditions are satisfied;

a first condition where a currently processed subband is not a band of a lowest frequency compared with said subbands,

20 a second condition where a currently processed bit plane has weight lighter than predetermined weight, and

a third condition where said number of "1" in a currently processed subbit plane is equal to or lower than a predetermined value.

25 15. The program according to claim 14, wherein said requantization step resets all currently processed subbit planes to "0", when said three conditions are satisfied.

16. The program according to claim 14, wherein said  
requantization step resets all currently processed subbit planes and  
subbit planes lower in order than said subbit planes to "0", when  
5 said three conditions are satisfied.

17. The program according to claim 14, wherein said  
requantization step cancels processing of a currently processed code  
block and carries out processing of a next code block, when said  
10 three conditions are satisfied.

18. The program according to claim 14, wherein said  
predetermined weight of said second condition and said  
predetermined value of said number of "1" of said third condition  
15 can be selected for every subbands and in accordance with a  
decomposition level of said conversion step.